(1)

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

115th Tactical Control Squadron

Hall Air National Guard Station
Alabama Air National Guard
Dothan, Alabama

February 1991

HAZWRAP SUPPORT CONTRACTOR OFFICE
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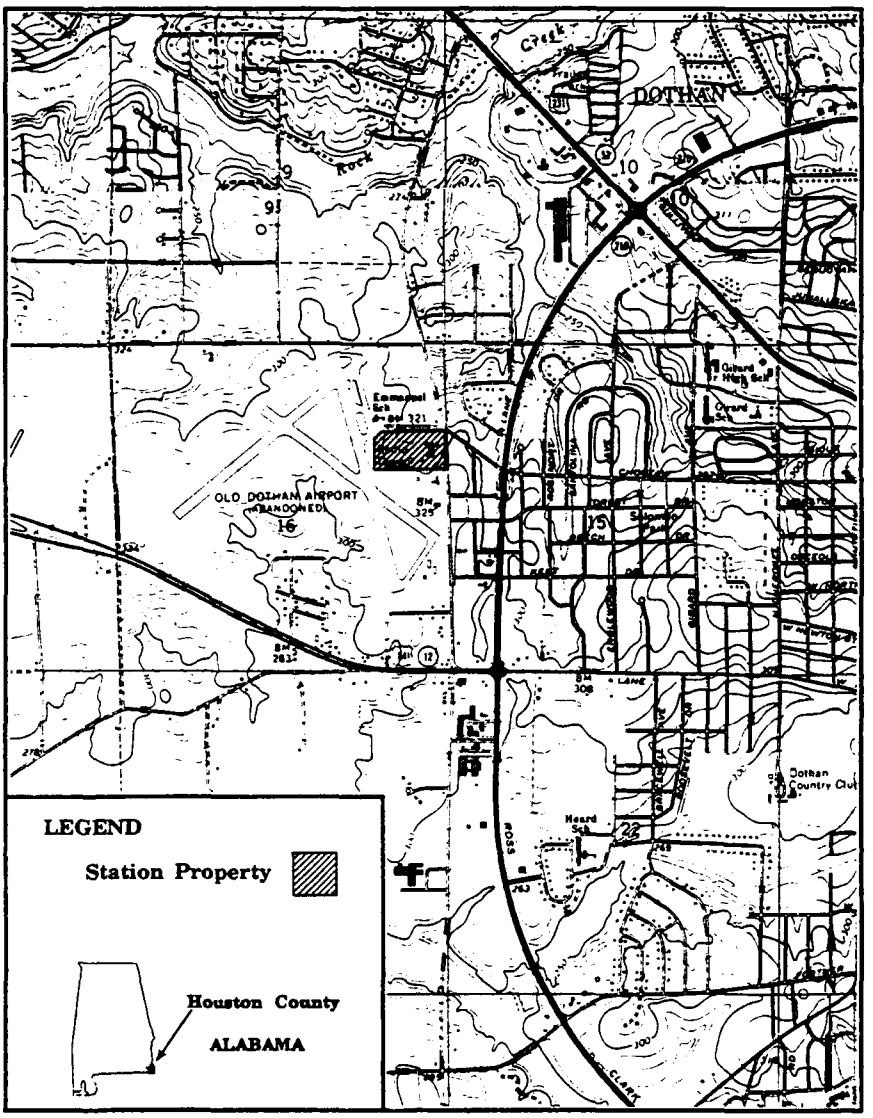

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Preliminary environmental assessment for the Hall Air National Guard Station, as part of the Installation Restoration Program. The report reflects data gathered from records review, interviews, and a site visit. No sites were identified as potentially contaminated and no further action was recommended for the base.

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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

115th TACTICAL CONTROL SQUADRON
HALL AIR NATIONAL GUARD STATION
ALABAMA AIR NATIONAL GUARD
DOTHAN, ALABAMA

Prepared for

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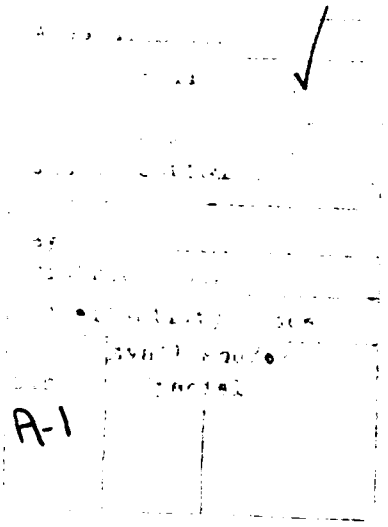

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February 1991

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ACRONYM LIST

AGE	Aerospace Ground Equipment
ANG	Air National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CES	Civil Engineering Squadron
CFR	Code of Federal Regulations
CRP	Control and Reporting Post
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EPA	Environmental Protection Agency
FR	Federal Register
FS	Feasibility Study
GPM	Gallons Per Minute
HAS	Hazard Assessment Score
HAZWRAP	Hazardous Waste Remedial Actions Program
IRP	Installation Restoration Program
JP-4	Jet Fuel
MOGAS	Automotive Gasoline
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
OWS	Oil/Water Separator
PA	Preliminary Assessment
PL	Public Law
POC	Point of Contact
RCRA	Resource Conservation and Recovery Act of 1976
R&D	Research and Development
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SciTek	Science & Technology, Inc.
SI	Site Investigation
TCS	Tactical Control Squadron
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
UST	Underground Storage Tank

EXECUTIVE SUMMARY

A. INTRODUCTION

Science & Technology, Inc. (SciTek) was retained to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 115th Tactical Control Squadron (TCS), Hall Air National Guard (ANG) Station [hereinafter referred to as the Station], Alabama Air National Guard, located at Dothan, Alabama. For the purpose of this document, the Station shall include the total area leased by the 115th TCS at Dothan, Alabama.

The PA included the following activities:

- an on-site visit, including interviews with a total of four persons familiar with Station operations, and field surveys by SciTek representatives during the week of April 16-20, 1990;
- acquisition and analysis of information on past hazardous materials use, waste generation, and waste disposal at the Station;
- acquisition and analysis of available geological, hydrological, meteorological, and environmental data from federal, state, and local agencies; and
- the identification and assessment of sites on the Station that may have been contaminated with hazardous wastes.

B. MAJOR FINDINGS

The 115th TCS has utilized hazardous materials and generated small amounts of wastes in mission-oriented operations and maintenance at the Station since 1955.

Operations that have involved the use of hazardous materials and the disposal of hazardous wastes include vehicle maintenance, aerospace ground equipment (AGE) maintenance, and electronics maintenance. The hazardous wastes disposed of through these operations include varying quantities of petroleum-oil-lubricant products, acids, paints, thinners, strippers, and solvents.

The field surveys and interviews resulted in no sites being identified that exhibit the potential for contaminant presence and migration.

C. CONCLUSIONS

It has been concluded there are no sites where a potential for contaminant presence exists.

D. RECOMMENDATIONS

No further work under the IRP is recommended.

I. INTRODUCTION

A. Background

The 115th Tactical Control Squadron (TCS), Hall Air National Guard (ANG) Station [hereinafter referred to as the Station] is located at Dothan, Alabama. The 115th TCS has been active at their present location since 1955. Both the past and current operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of resultant wastes, the National Guard Bureau (NGB) has implemented the Installation Restoration Program (IRP).

The IRP is a comprehensive program designed to:

- Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on Department of Defense (DoD) installations and

- Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act of 1976 (RCRA) and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, Public Law (PL) 96-510), commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via an Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5 (December 11, 1981), which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the Environmental Protection Agency (EPA) Superfund programs were essentially the same, differences in the definition of program activities and lines of authority resulted in some confusion between DoD and state/federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes effected by SARA included the following:

- Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan [40CFR300], listing on the National Priorities List, and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the EPA under Superfund authority.

- Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).

- SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

- **Preliminary Assessment**

  The Preliminary Assessment (PA) process consists of personnel interviews and a records search designed to identify and evaluate past disposal and/or spill sites that might pose a potential and/or actual hazard to public health, public welfare, or the environment. Previously undocumented information is obtained through the interviews. The records search focuses on obtaining useful information from aerial photographs; Station plans; facility inventory documents; lists of hazardous materials used at the Station; Station subcontractor reports; Station correspondence; Material Safety Data Sheets; federal/state agency scientific reports and statistics; federal administrative documents; federal/state records on endangered species, threatened species, and critical habitats; documents from local government offices; and numerous standard reference sources.

o **Site Inspection/Remedial Investigation/Feasibility Study**

The Site Inspection consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the PA. An expanded Site Inspection has been designed by the Air National Guard as a Site Investigation. The Site Investigation (SI) will include additional field tests and the installation of monitoring wells to provide data from which site-specific decisions regarding remediation actions can be made. The activities undertaken during the SI fall into three distinct categories: screening activities, confirmation and delineation activities, and optional activities. Screening activities are conducted to gather preliminary data on each site. Confirmation and delineation activities include specific media sampling and laboratory analysis to confirm either the presence or the absence of contamination, levels of contamination, and the potential for contaminant migration. Optional activities will be used if additional data is needed to reach a decision point for a site. The general approach for the design of the SI activities is to sequence the field activities so that data are acquired and used as the field investigation progresses. This is done in order to determine the absence or presence of contamination in a relatively short period of time, optimize data collection and data quality, and to keep costs to a minimum.

The Remedial Investigation (RI) consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests, which may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples, are required. Careful documentation and quality control procedures in accordance with CERCLA/SARA guidelines ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration. The findings from these studies result in the selection of one or more of the following options:

1. **No Further Action** - Investigations do not indicate harmful levels of contamination that pose a significant threat to human health or the environment. The site does not warrant further IRP action, and a Decision Document will be prepared to close out the site.

2. **Long-Term Monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.

3. **Feasibility Study** - Investigation confirms the presence of contamination that may pose a threat to human health and/or the environment, and some sort of remedial action is indicated. The Feasibility Study (FS) is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action with concurrence by state and/or federal regulatory agencies.

- **Remedial Design/Remedial Action**

The Remedial Design involves formulation and approval of the engineering designs required to implement the selected remedial action. The Remedial Action is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

- **Research and Development**

Research and Development (R&D) activities are not always applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

- **Immediate Action Alternatives**

At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate action, such as limiting access to the site, capping or removing contaminated soils, and/or providing an alternate water supply may suffice as effective

control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP PA is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on Station property.

The potential for migration of hazardous contaminants was evaluated by visiting the Station, reviewing existing environmental data, analyzing Station records concerning the use of hazardous materials and the generation of hazardous wastes, and conducting interviews with current Station personnel who had knowledge of past waste disposal techniques and handling methods. Pertinent information collected and analyzed as part of the PA included a records search of the history of the Station; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants; and ecological settings that indicate environmentally sensitive conditions.

C. Scope

The scope was limited to the identification of sites at or under primary control of the Station and evaluation of potential receptors. The PA included:

- an on-site visit during the week of April 16-20, 1990;
- acquisition of records and information on hazardous materials use and waste handling practices;
- acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat, and related data from federal and state agencies;
- a review and analysis of all information obtained; and
- preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Tracy C. Brown, Environmental Analyst; Mr. Charles T. Goodroe, Environmental Protection Specialist; and Mr. Stephen

B. Selecman, Geologist/Hydrogeologist. Mr. Russ Dyer of the NGB is Project Officer for this Station. Ms. Patricia Franzen of the Hazardous Waste Remedial Actions Program (HAZWRAP) also participated in the station visit.

The points of contact (POCs) at the Station were Lieutenant Colonel John H. Hodges and First Lieutenant John D. Evers. Captain Michelle Fuller (187th Civil Engineering Squadron (CES)) was the representative from their civil engineering support facility.

D. Methodology

The PA began with a visit to the Station to identify all operations that may have utilized hazardous materials or may have generated hazardous wastes. Figure I.1 is a flow chart of the PA methodology.

Four current Station employees familiar with the various operating procedures were interviewed. These interviews were conducted to determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment. The interviewees' knowledge and experience with Station operations averaged 26 years and ranged from 19 to 32 years.

Records contained in the Station files were collected and reviewed to supplement the information obtained from the interviews.

Detailed geological, hydrological, meteorological, and environmental data for the area were obtained from the appropriate federal, state, and local agencies. A listing of agency contacts is included as Appendix A.

After a detailed analysis of all the information obtained, it was concluded that no sites were identified to be potentially contaminated with hazardous wastes. Under the IRP program, when sufficient information is available, sites are numerically scored and assigned a Hazard Assessment Score (HAS) using a hazard assessment rating methodology. However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather, may indicate a lack of data.

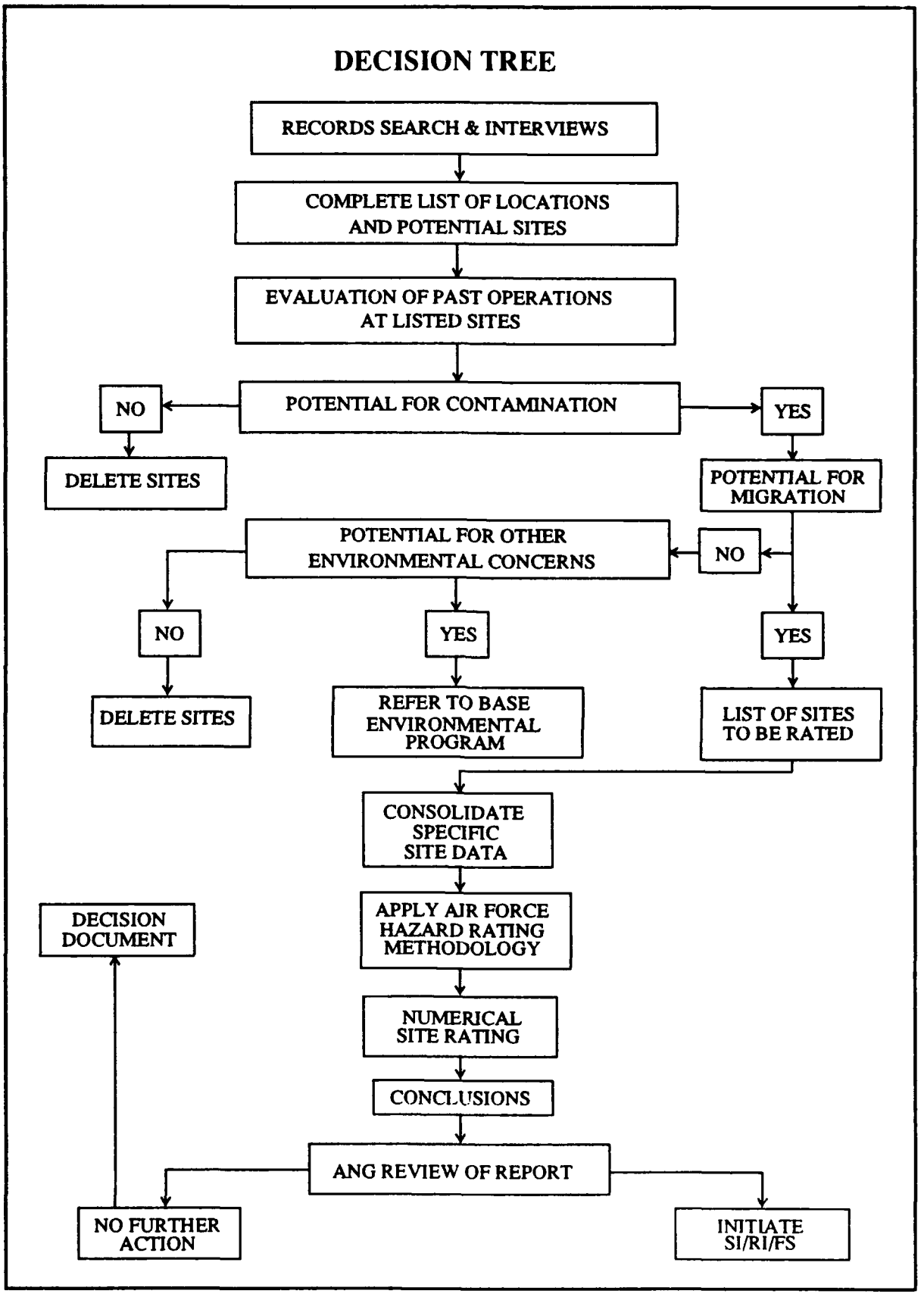


Figure I.1

Preliminary Assessment Methodology Flow Chart

II. INSTALLATION DESCRIPTION

A. Location

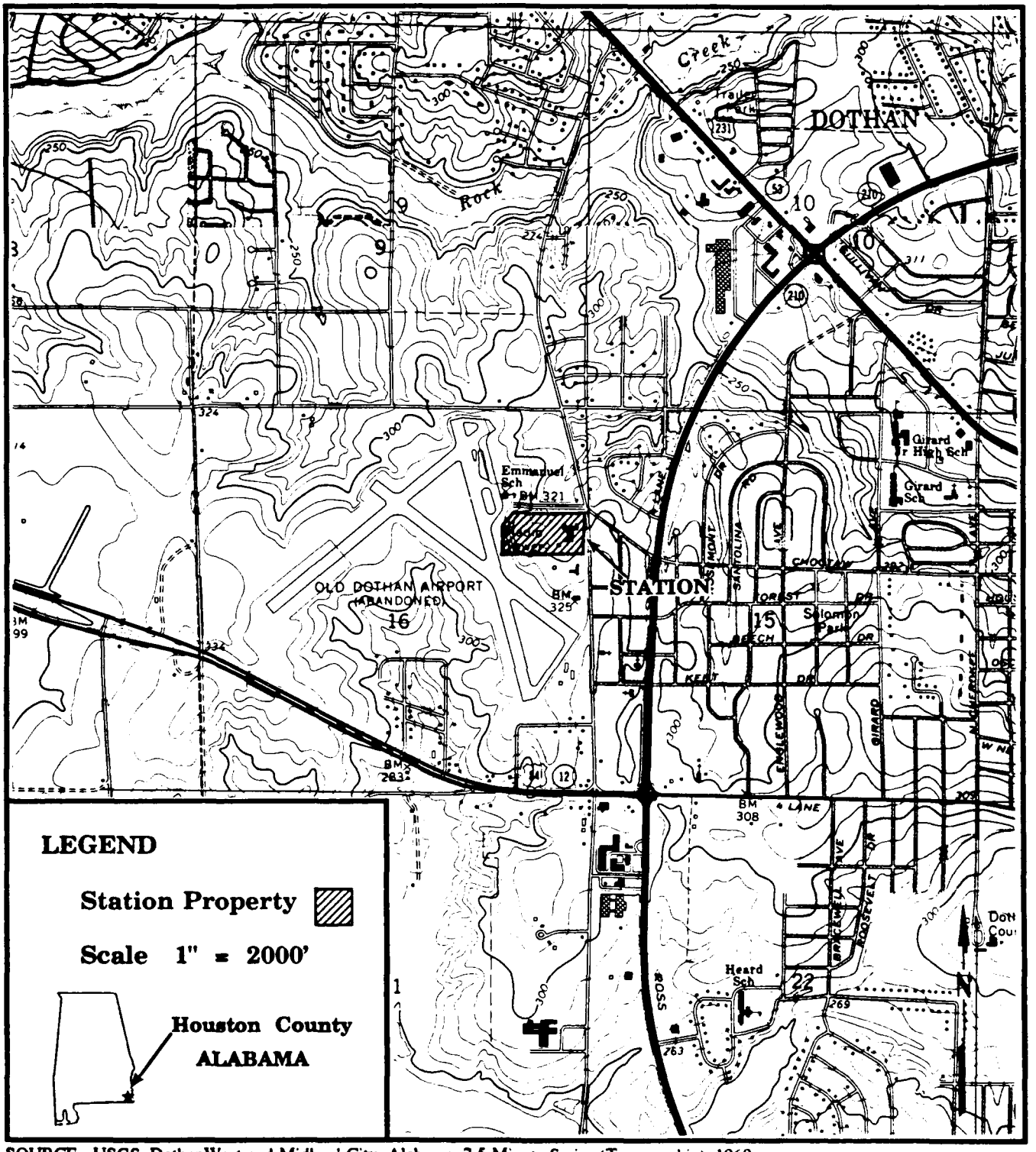
The 115th TCS is located within the city of Dothan, Houston County, Alabama. It is situated adjacent to the Old Municipal Airport, on the corner of Airport Road and West Gate Parkway. Figure II.1 illustrates the location and boundaries of the Station.

The Station occupies 13.5 acres and is completely fenced with controlled access. The principal structure (Bldg. 100) houses the Headquarters and Administrative elements and vehicle maintenance actives. Other structures at the Station are the Radar Facility (Bldg. 127), Maintenance Control (Bldg. 110), Mobility Warehouse (Bldg. 109), and the aerospace ground equipment (AGE) Shop (Bldg. 115). The unimproved acreage is used to conduct training and for parking of equipment. The population during the weekday numbers 45 members. Unit Training Assembly occurs one weekend per month. The Station population during this weekend is 283 members.

B. Organization and History

The mission of the 115th TCS is to operate a computerized Control and Reporting Post (CRP) as part of a Tactical Air Control System. The CRP is a mobile radar unit that provides radar surveillance and control within an assigned area of responsibility. During air defense operations, the CRP detects and identifies hostile airborne objects, designates air defense warning conditions, directs interceptor, and scrambles or diverts air defense aircraft. The basic mission of the unit has not changed but has been enhanced with the advent of new technology. The unit has participated in many joint exercises including overseas deployment. The unit possesses the personnel and equipment necessary to establish and maintain operations indefinitely as long as logistically supported.

The 115th TCS was originally organized as the 115th Aircraft Control and Warning Squadron at Birmingham, Alabama. It was mobilized on December 1, 1951 and was relocated to Geiger Field, Spokane, Washington. The unit returned to state control on December 1, 1953 and was assigned to Dothan, Alabama. In April 1955, the unit moved to their present location. Starting with one building and five acres, the unit now has several permanent structures and over thirteen acres. The main building was renovated in the early 1970's, and additional construction, as well as an equipment update, is planned for the future.



SOURCE: USGS, DothanWest and Midland City, Alabama, 7.5 Minute Series (Topographic), 1969.

Figure II.1

Location Map of
the Hall Air National Guard Station

The Station has always supported a maintenance function. For the last 35 years, maintenance functions have ranged from repair and servicing of motor vehicles and AGE items to the repair and test of electronic equipment. Underground storage tanks (USTs) for diesel oil, gasoline, and aviation fuel support the operations of this property. Above ground tanks are used for temporary storage of jet fuel (JP-4) and waste oils. An oil/water separator (OWS) has been installed and is inspected weekly and cleaned monthly to ensure contaminants are not entering the sanitary sewer system. The possibility of a spill or another form of environmental contamination does exist. However, Station personnel have taken care in the past, and the property shows no environmental degradation due to hazardous materials or hazardous wastes.

Materials recognized as hazardous today have been generated on this property in the past. A common practice of using waste oil or fuel for dust and weed control may have taken place. With the awareness of hazardous materials and the recognition of their impact on the environment, acceptable disposable practices and procedures have evolved. The hazardous wastes are now collected and disposed of through contractors and the Defense Reutilization and Marketing Office (DRMO) or collected for recycling.

III. ENVIRONMENTAL SETTING

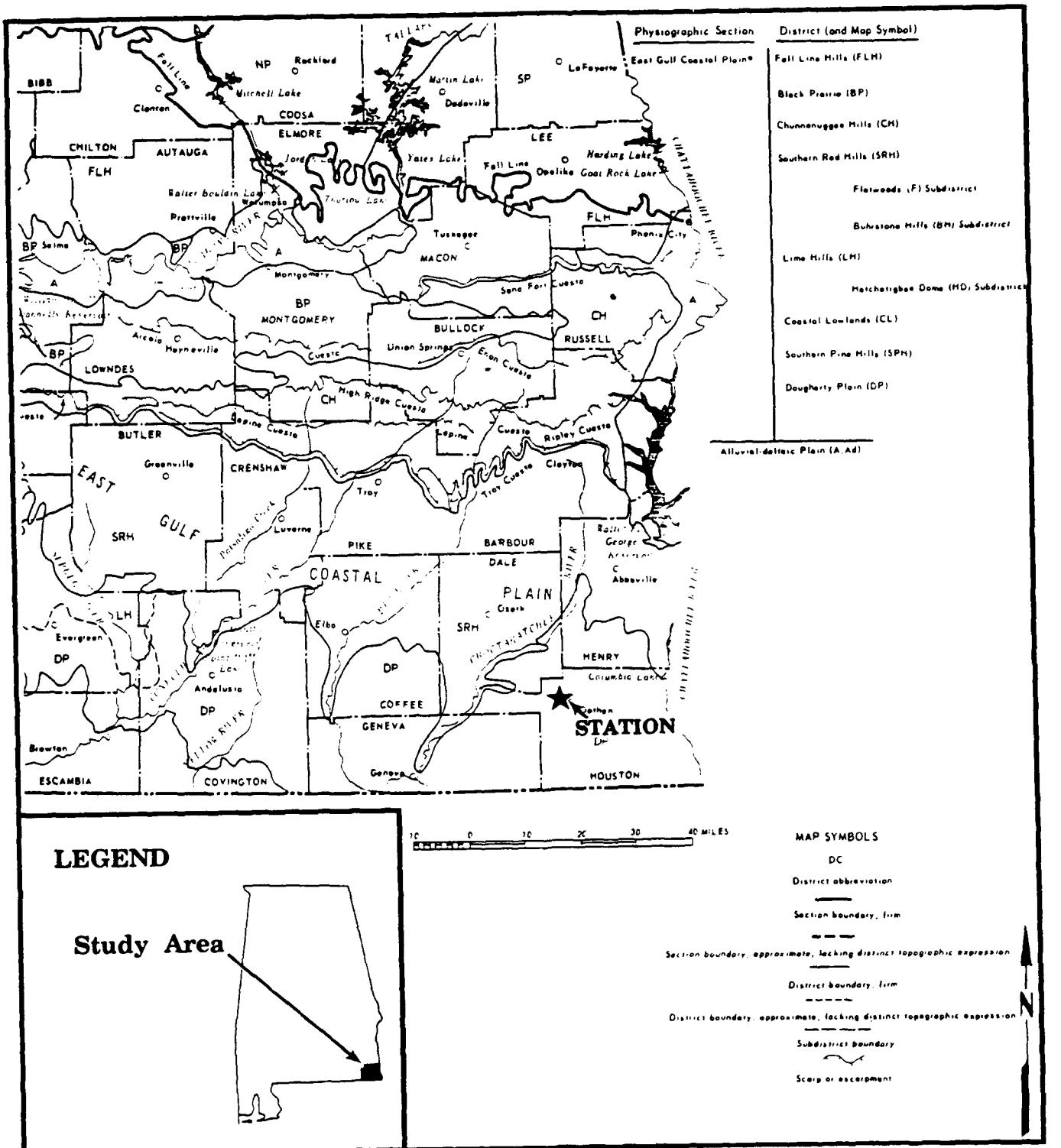
A. Meteorology

The following climatological data is largely derived from the Climatic Atlas of the United States (United States Department of Commerce, National Climatic Center, Asheville, N.C., 1979), and the Soil Survey of Houston County, Alabama (United States Department of Agriculture (USDA): Soil Conservation Service, February 1968). Houston County is characterized by a warm and humid climate that borders on being subtropical. Summers are long and hot, and winters are short and mild. The total average annual precipitation, based on records from Dothan, is 52.6 inches. It ranges from an average monthly high of 6.0 inches in March to an average monthly low of 2.0 inches in October. By calculating net precipitation according to the method outlined in the Federal Regulations CERCLA Pollution Contingency Plan (United States Environmental Protection Agency, 55 FR 8813, Subpart K, March 8, 1990), a net precipitation value of 7.5 inches is obtained. The 1-year, 24-hour rainfall total for the county is approximately 3.75 inches. Thunderstorms can occur on an average of 75 to 80 days a year, usually in the summer months. Snowfall does occur in the winter, but in most years only a trace is recorded. The average annual temperature reported is 67.0°F. The average monthly temperature ranges from a high of 81.5°F in July and August to a low of 51.0°F in January. Prevailing winds are from the southwest and are generally light. The average annual wind speed is 7.8 miles per hour, and the maximum average wind speed is 10 miles per hour in the month of March.

B. Geology

Houston County is located in the southeastern part of the East Gulf Coastal Plain physiographic section and within the Dougherty Plain physiographic district (Figure III.1). The Dougherty Plain is a limestone upland that is characterized by low relief cuestas and stream valleys with low to moderate relief. Specifically, the Station is located along the gently sloping east flank of a cuesta with surface elevations ranging from 290 to 320 feet above mean sea level.

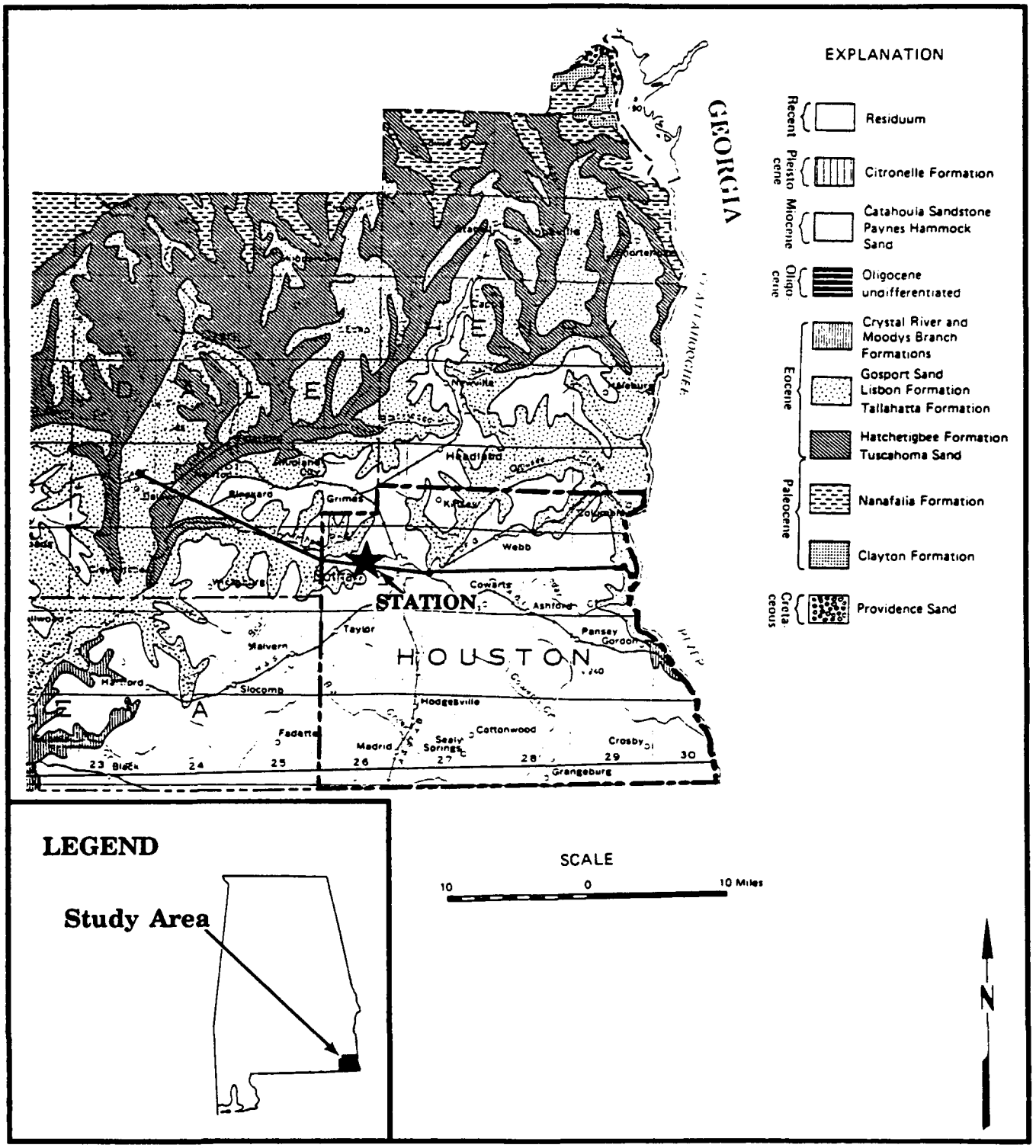
Geologic formations that crop out in Houston County are of sedimentary origin and range in age from Tertiary to Recent. The Tertiary Residuum crops out throughout the county except along major stream channels where Quaternary Alluvium is present (Figure III.2). Also, in the northern and eastern parts of the county, stream dissection has exposed the older Tertiary Tallahatta, Lisbon, Moodys Branch, and Ocala Formations (Causey et al, 1967). These stratigraphic units along with the deeper unexposed formations are shown in Figure III.3.



SOURCE: Sapp and Emplaincourt, Physiographic Regions of Alabama, Geological Survey of Alabama, Map #168, 1975.

Figure III.1

Physiographic Map of the Area



SOURCE: Moffett et al., Reconnaissance of Ground-Water Conditions in Southeast Alabama. Geological Survey of Alabama, Circular #123, 1985.

Figure III.2

Surficial Geologic Map of the Area

System	Series	Geologic unit	Thickness (feet)	Lithology	Water availability		Quality of the water	
Quaternary	Recent and Pleistocene	Alluvium and terrace deposits	0-30±	Sand, yellowish-gray to white, fine- to coarse-grained, gravelly; yellowish-gray silty clay.	Will yield 10 gpm or more per well where saturated sands and gravels are of sufficient thickness.		Water of satisfactory quality for most uses.	
Tertiary	Miocene, Oligocene, and Eocene	Residuum	50-125±	Sand, yellowish-orange to white, medium to very coarse grained, gravelly; varicolored sandy clay; grayish-yellow to white fossiliferous chert boulders; ferruginous sandstone; limonite.				
	Eocene	Ocala Limestone and Moodys Branch Formation undifferentiated[3]	45-140±	Limestone, pale-orange to white, chalky, fossiliferous, locally cavernous; greenish-gray fine- to coarse-grained glauconitic sand; yellowish-gray calcareous silty clay.		Yields 10 gpm or more per well in most parts of the county. Will yield 1 mgd or more per well where cavity system in limestone is extensive.	Water generally is moderately hard but locally contains iron in excess of 0.3 ppm.	Major Shallow Aquifer
		Litalum Formation	70-125±	Sand, yellowish-orange to greenish-gray, fine to very coarse grained, silty, glauconitic; yellowish-gray glauconitic sandy limestone; greenish-gray calcareous sandy clay; greenish-gray laminated to thin-bedded calcareous sandy siltstone.		Yields 10 gpm or more per well in most of the county. Aquifers in these formations developed in conjunction with aquifers in the overlying Ocala Limestone and Moodys Branch Formation will yield 1 mgd or more per well in central and southern parts of the county.	Water is soft to hard, generally soft in updip areas, and locally contains iron in excess of 0.3 ppm.	
		Tallahatta and Hatchetigbee Formations undifferentiated[3]	125-150±	Sand, greenish-gray, medium to very coarse grained, glauconitic, fossiliferous; light-gray sandy limestone; light-gray to white siltstone and clay; medium- to dark-gray micaceous carbonaceous clay.			Water generally is moderately hard to hard, and locally contains iron in excess of 0.3 ppm.	
		Tuscahoma Sand[3]	170-260±	Clay, medium- to dark-gray, laminated to thin-bedded, carbonaceous, micaceous, sandy, silty; light-gray calcareous silty sandstone. Basal 10 to 40 feet consists of greenish-gray medium to very coarse grained glauconitic fossiliferous sand that locally contains gravel.	Upper part is relatively impermeable. Not generally developed as a source of ground water.			
		Nanafalia Formation[3]	135-150±	Sand, light-greenish-gray, medium- to coarse-grained, sparsely glauconitic; light-gray fossiliferous sandy limestone; light-gray calcareous sandy clay. Basal part locally consists of very coarse grained gravelly sand.	Combined aquifers in formations will yield 1 mgd or more to properly constructed individual wells in all parts of the county. Locally, combined aquifers in any two of these formations will yield 1 mgd or more.		Water is moderately hard to hard, has a dissolved solids content of less than 350 ppm, and locally contains iron in excess of 0.3 ppm.	Major Intermediate Aquifer
	Paleocene	Clayton Formation[3]	125-150±	Limestone, light-gray, sandy, fossiliferous; light-gray to yellowish-gray medium- to coarse-grained sand; medium- to dark-gray calcareous micaceous sandy clay.				
Cretaceous	Upper Cretaceous	Providence Sand[3]	200±	Sand and clayey sand, gray, fine- to coarse-grained, glauconitic, micaceous, fossiliferous; gray calcareous micaceous clay; sandy fossiliferous limestone; calcareous fossiliferous sandstone.	Potential source of large supplies in northern part of county if saturated sands are of sufficient thickness. In Dale County to the northwest, wells tapping sands in the formation in conjunction with overlying aquifers are capable of yielding 1 mgd or more per well.		Electrical characteristics recorded on logs run in oil test wells indicate water may be of satisfactory quality for most uses in northern one-third of county. Water is probably excessively mineralized in central and southern parts of county.	Major Deep Aquifer
		Ripley Formation[3]	350±	Sand, white to gray, fine- to coarse-grained, glauconitic, micaceous, fossiliferous; light- to dark-gray calcareous fossiliferous clay; sandy fossiliferous limestone.	Potential source of large supplies in northern one-third of county. Aquifers in formation underlying central Dale County to the northwest are capable of yielding 1 mgd or more per well.			
		Blufftown Formation[3]	850±	Clay, dark-gray, sandy, silty, micaceous, carbonaceous; gray silty clay and sandy limestone.	Relatively impermeable; not a source of ground water in Houston County.			
		Eutaw Formation[3]	300±	Clay, gray, sandy, calcareous, fossiliferous; very fine to fine-grained sand; thin beds of fossiliferous sandstone and limestone.	Potential source of small to moderate supplies in northern parts of county.		Electrical characteristics recorded on logs run in oil test wells indicate water may be of satisfactory quality for most uses in northernmost parts of county. Water is highly mineralized in remainder of county.	
		Tuscaloosa Group[3]	700-1,000±	Sand, gray, fine- to coarse-grained; varicolored clay and sandy clay.	Upper 200 to 300 feet is potential source of large supplies in northernmost parts of county.			

SOURCE: Scott et al., 1967; Moffett et al., 1985.

Figure III.3

Generalized Stratigraphic Column of the Area

The structural geology of the Tertiary Formations in Houston County is basically horizontal with a gentle regional slope toward the coast. The geologic strike is east-west while the dip is southward at a rate of 15 to 40 feet per mile (Causey et al, 1967). Most structural influences in the area are deep, and little is known about them. Outside of the Gordon Anticline in east-central Houston County, only minor faulting and folding has been recorded (Raymond et al, 1988).

The Station is underlain by the Tertiary Residuum (Figure III.3). Although the exact thickness at this location has not been determined, it generally ranges from 50 to 125 feet. The Residuum consists of limestone remains that have been altered by solution and replacement. In addition, the Residuum contains material from overlying beds that is a result of slumping, and, consequently, the lithologic composition is greatly disarranged. The basic lithology consists of a medium- to coarse-grained gravelly sand and sandy clay with fossiliferous chert boulders. Ferruginous sandstones, and limonite concretions can be found locally near the base of the Residuum (Causey et al, 1967). The Residuum is relatively impermeable as a whole (Carter et al, 1949).

Immediately underlying the Residuum are the Ocala Limestone and Moodys Branch Formation. These formations are generally undifferentiated and are mapped geologically along with the overlying Residuum (Causey et al, 1967). Exposure of these units at or near the surface likely occurs to the north and northeast of the Station. Here, surface drainage has eroded the upper part of the Residuum exposing the older beds. Lithologically, these units consist of medium- to coarse-grained fossiliferous glauconitic sand and fossiliferous chalky limestone. Thicknesses generally range between 45 and 140 feet but are not known exactly in the vicinity of the Station. Unlike the above Residuum, these beds may have excellent porosity and permeability where cavity systems exist (Scott et al, 1967).

The Lisbon Formation is the oldest and deepest geologic unit exposed in the immediate proximity of the Station. It outcrops approximately 0.75 miles north of the Station in the Rock Creek and Little Choctawhatchee River drainage incisions (Causey et al, 1967). The Lisbon is primarily composed of fine- to very coarse-grained glauconitic sand, glauconitic sandy limestone, calcareous sandy clay, and laminated calcareous sandy siltstone. Its thickness at this location is approximately 70 feet (Causey et al, 1967). Also, the Lisbon is considered to be highly porous and permeable (Carter et al, 1949).

The soils underlying the Station are comprised of the Dothan loamy sand and the Tifton fine sandy loam. The Dothan occurs in the west one-half and the Tifton in the east one-half of the property. Both soil types are classified as deep, well-drained soils of marine origin. They are common to upland terrains of Houston County. Soil thickness is commonly 60 to 72 inches, and permeabilities are considered moderate (0.63 to 2.00 inches per hour or 4.45

x 10^{-4} to 1.41 x 10^{-3} cm/sec) to moderately rapid (2.0 to 6.0 inches per hour or 1.41 x 10^{-3} to 4.24 x 10^{-3} cm/sec) for both types (Harris et al, 1968). The information pertaining to soils contained in the text was derived from the Soil Survey of Houston County, Alabama (United States Department of Agriculture (USDA): Soil Conservation Service, February 1968). Soil borings are not available for the Station.

C. Hydrology

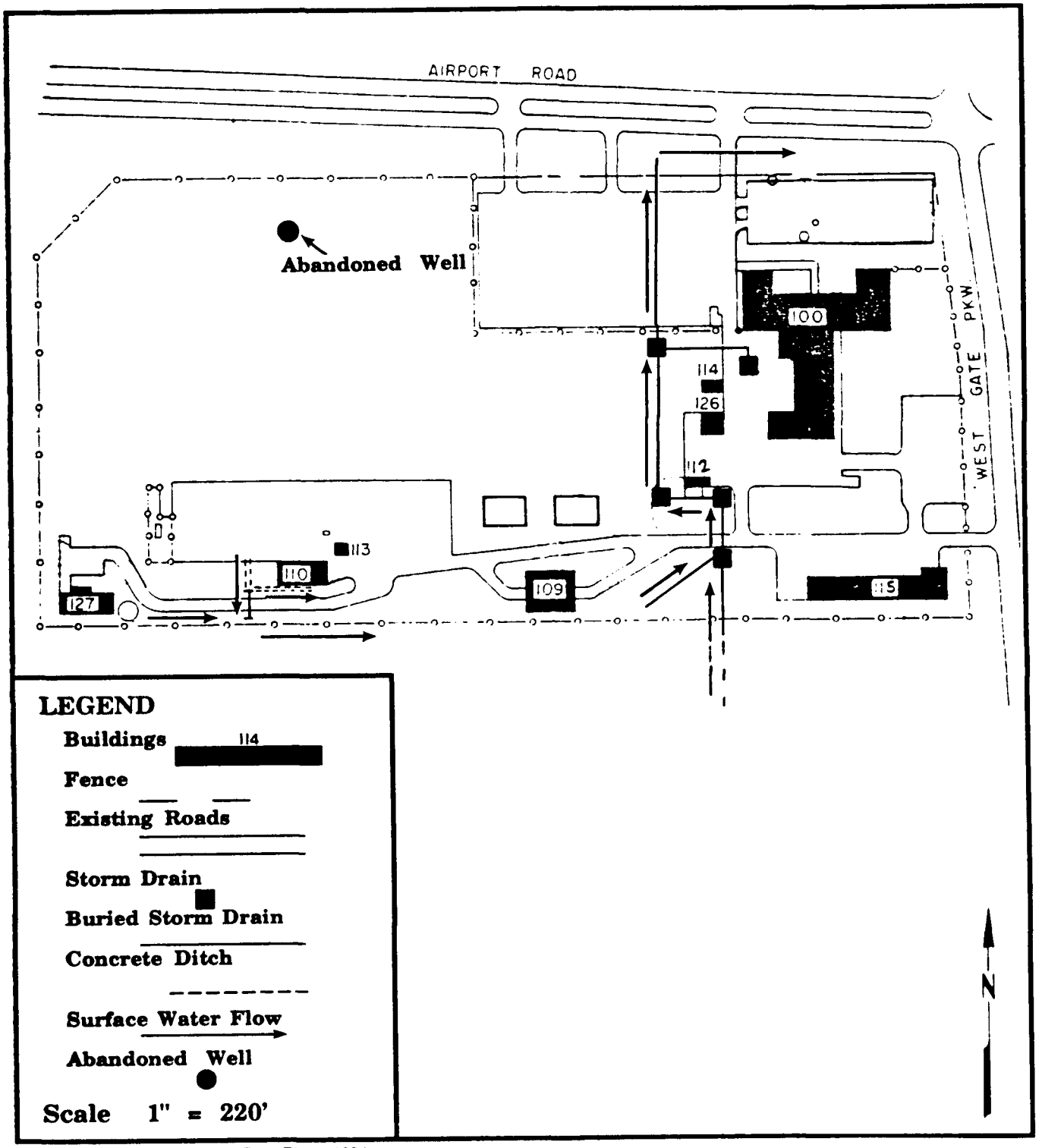
1. Surface Water

The Station is located in the Choctawhatchee River drainage basin. Surface water is collected in a series of five storm drains located toward the center of the property (Figure III.4). It is then transported northward underground until it exits along the northern boundary. After leaving the Station, surface water flows northeast along a natural drainage way 0.5 miles to an unnamed tributary of Rock Creek (Figure III.5). The unnamed tributary then flows into Rock Creek 0.9 miles to the north. Rock Creek flows westward from this point 1.1 miles to the Little Choctawhatchee River where flow continues westward 14 miles to the Choctawhatchee River. The Station is not located within the 100-year flood plain (Federal Emergency Management Agency, 1988).

2. Groundwater

Three major aquifers exist in Houston County and are termed shallow, intermediate, and deep (Moffett et al, 1985). Aquifers are classified in groups of formations that are hydraulically connected and are separated from one another through the occurrence of probable aquicludes. A breakdown of the aquifer classification is shown on Figure III.2 along with potential water yields for each group. With respect to the Station, the shallow aquifer is of primary concern because it is recharged immediately north of the Station (Scott et al, 1988). The recharge areas for the intermediate and deep zones are located far to the north of the Station in adjacent counties.

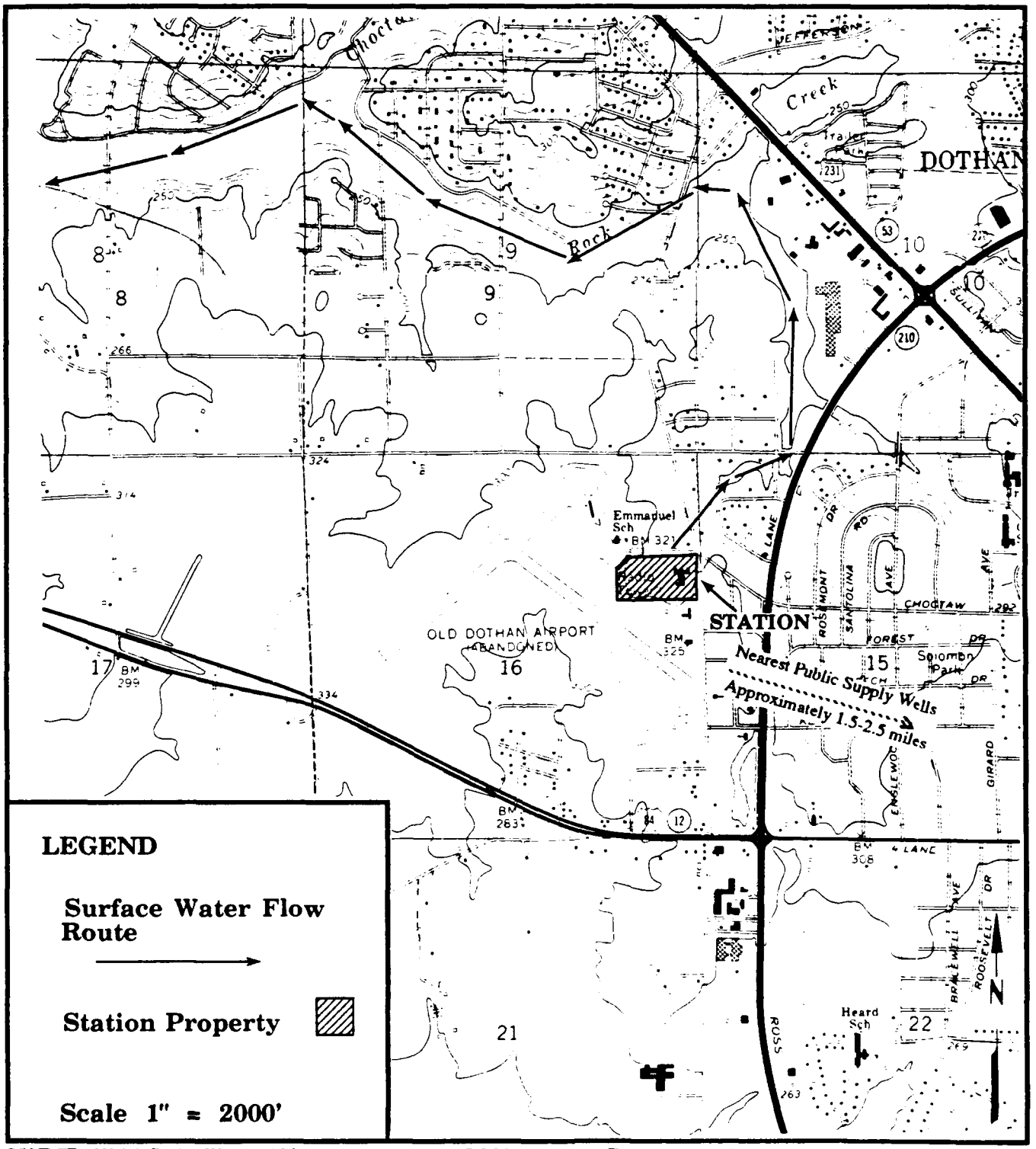
The major shallow aquifer is composed of the Ocala Limestone, the Moodys Branch, Lisbon, Tallahatta, and Hatchetighee Formations. It is considered to be a confined aquifer with recharge areas that coincide with its outcrop in the stream valleys of northern Houston County and adjacent counties (Scott et al, 1967). Recharge of the shallow aquifer likely occurs north of the Station along parts of Rock Creek and the Little Choctawhatchee River (Figure III.3). The depth to the base of this aquifer at the Station is estimated at 450 feet below the surface (Scott et al, 1967). The occurrence of groundwater reservoirs here are associated with the development of cavity systems in the limestone members. General groundwater movement is to the southeast. The shallow



SOURCE: Hall ANG Station Base Plans, 1984.

Figure III.4

Station Drainage Map



SOURCE: USGS, DothanWest and Midland City, Alabama, 7.5 Minute Series (Topographic), 1969.

Figure III.5

Surface Water Flow Route Map

aquifer is a major source of domestic water supply and a supplemental source of public water supply in the Dothan area (Scott and Cobb, 1988). The major shallow aquifer does not yield sufficient quantities of water for public use north of an east-west line located approximately 1.5 miles south of the Station (Scott et al, 1967).

With respect to the Station, the Residuum is also of slight concern in terms of groundwater. Where sufficient thicknesses of sand and gravel occur, it yields quantities of water sufficient for domestic use. Water yields can be 10 GPM (gallons per minute) or more where the aquifer is adequately developed (Scott et al, 1967). These aquifers are generally not contiguous and are extremely localized in occurrence. Therefore, the areas of recharge coincide with the occurrence of the aquifer (Scott and Cobb, 1988). Water from the Residuum is commonly used for domestic purposes only, and few or no public water supplies are derived from this source (Carter et al, 1949).

Public supplies of water are obtained from all three major aquifers in the Dothan area. The public supply wells closest to the Station are the city of Dothan wells #9, #10, and #12 located approximately 1.5 to 2.5 miles to the east and southeast of the Station. These wells are screened in the intermediate aquifer only. The closest public supply well screened in the shallow aquifer, the city of Dothan well #7, is located approximately 2.25 miles southeast of the Station (Scott and Cobb, 1988). No domestic water wells of record exist on or within a 0.5 mile radius of the Station. However, one test well was drilled on the property for the city of Dothan (Figure III.4). Formal records are not available for the well, but it is believed to have tested 300-400 GPM from the shallow aquifer.

The susceptibility of groundwater to contamination from the Station is considered to be moderately low to low risk. This conclusion stems from the impermeable nature of the Residuum underlying the Station and the characteristic lack of groundwater reservoir development here. Also, the impermeable nature of the Residuum prevents recharge of the major shallow aquifer except where it crops out north of the Station. This area of recharge is situated approximately 1.3 miles downstream of surface drainage flow from the Station. Furthermore, the closest screened public water supply well in the shallow aquifer is located approximately 2.5 miles southeast of the nearest recharge area affected by the Station drainage. The major intermediate and deep aquifers are of little concern with respect to the Station. They are recharged far to the north and are not subject to vertical communication because of their confined nature.

D. Critical Habitats/Endangered or Threatened Species

According to current records maintained by the Alabama Department of Conservation and Natural Resources, Alabama Natural Heritage Program, no endangered or threatened species of flora or fauna have been formally identified within a 1-mile radius of the Station. However, the Alabama Natural Heritage Program emphasizes that this area may not have been formally surveyed and that several endangered or threatened species might occur within this area. The following floral and faunal species might occur within a 1-mile radius of the Station:

Floral Species

Schwalbea americana (chaffseed)
Aster chapmanii (Chapman's aster)
Brickellia cordifolia (Flyr's nemis)
Brickellia mosiera (No common name)
Macbridea carolina (birds-in-a-nest)
Matelea alabamensis (Alabama spiny-pad)
Rudbeckia triloba var. *pinnatiloba* (coneflower)
Tephrosia mohrii (Mohr's goat's-rue)

Faunal Species

Gopherus polyphemus (gopher tortoise)
Rana areolata sevosa (dusky gopher frog)
Picoides borealis (Red-Cockaded Woodpecker)
Etheostoma davisoni (Choctawhatchee darter)
Pituophis melanoleucas mugitus (Florida pine snake)

No formally identified critical habitats are located within a 1-mile radius of the Station. The U.S. Fish and Wildlife Service has not surveyed the study area for wetlands.

IV. SITE EVALUATION

A. Activity Review

A review of Station records and interviews with personnel were used to identify specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, processed, and disposed. Table IV.1 provides a history of waste generation and disposal for operations conducted by shops at the Station. If an item is not listed on the table on a best-estimated basis, that activity or operation produces negligible (less than 1 gallon/year) waste requiring disposal.

The potable water supply and sanitary sewer service for the Station are provided by the Water and Electric Department of the city of Dothan. A capped water well drilled for the city of Dothan is located within the Station boundaries. Neither the city nor the Station has ever used the potable water from this municipal test well.

B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment

Four persons were interviewed to identify and locate potential sites that may have been contaminated by hazardous wastes as a result of past Station operations. No potentially contaminated sites were identified.

C. Other Pertinent Facts

- From 1955 to 1988, trash and non-hazardous solid wastes from the Station were disposed of by the city of Dothan. Since 1989 International Service Systems, Inc. has collected these wastes and disposed of them in the City of Dothan Landfill.

- The abandoned OWS at the vehicle wash rack just west of Building 100 (Headquarters/Vehicle Maintenance) was connected to the storm sewer system from its installation in 1975 until it was taken out of service because of malfunctions in 1984. A new OWS, connected to the sanitary sewer system, was installed at the wash rack around 1984. It is checked regularly and cleaned as needed.

  The OWS at Building 115 (AGE Shop) was installed around 1972 and taken out of service in 1985. It was not malfunctioning when it was taken out of service.

Table IV.1 Hazardous Materials/Hazardous Wastes Disposal Summary: Hall Air National Guard Station, Dothan, Alabama.

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal 1955	1960	1970	1980	1990
Vehicle Maintenance (Bldg. 100)	Engine Oil	1000	UNK		CONTR	AAC	
	Battery Acid	100	UNK		DPDO		DRMO
	Ethylene Glycol	25	UNK		STORM	CONTR/AAC	
	Lubricating Oil	3	UNK		PROC		
	Hydraulic Oil	5	UNK		CONTR	AAC	
	Transmission Oil	5	UNK		CONTR	AAC	
	Paint Thinner	4	UNK		STORM		DRMO/CONTR
	Brake Fluid	10	UNK		STORM	AAC	
	Diesel Fuel	20	UNK		CONTR	AAC	
	Grease	25 lbs	UNK		RAGS/TRASH		
	Mineral Spirits	250	UNK		STORM	NLU	

KEY:

AAC	-	Picked up by the U.S. Army Aviation Center (USAANC) at Ft. Rucker, Alabama for recycling.
CONTR	-	Disposed of through a contractor.
DPDO	-	Disposed of through the Defense Property Disposal Office.
DRMO	-	Disposed of through the Defense Reutilization & Marketing Office.
FTA	-	Joint use fire training area (Westgate Fire Station) owned by the City of Dothan Fire Department.
H	-	Individuals picked up materials for household use.
LNDF	-	Material sent to local municipal dump or landfill.
NIU	-	Material was not in use at this time.
NLU	-	Material is no longer used.
PROC	-	Material used up in process (i.e. evaporation).
RAGS/TRASH	-	Wiped on rags and rags disposed of in general trash that went to a municipal dump or landfill.
STORM	-	Disposed of through the storm sewer system.
UNK	-	Disposal method is unknown.

Table IV.1 Hazardous Materials/Hazardous Wastes Disposal Summary: Hall Air National Guard Station, Dothan, Alabama (continued).

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal 1955	1960	1970	1980	1990
Aerospace Ground Equipment (AGE) Maintenance (Bldg. 115)	Engine Oil	50	UNK	H/LNDF	CONTR	AAC	
	JP-4	400	UNK	NIU	CONTR	FTA/AAC	
	Battery Acid	60	UNK	DPDO			DRMO
	Lubrication Oil	1	UNK	NIU		PROC	
	7808 Oil	60	UNK	NIU	CONTR	AAC	

KEY:

AAC	-	Picked up by the U.S. Army Aviation Center (USAANC) at Ft. Rucker, Alabama for recycling.
CONTR	-	Disposed of through a contractor.
DPDO	-	Disposed of through the Defense Property Disposal Office.
DRMO	-	Disposed of through the Defense Reutilization & Marketing Office.
FTA	-	Joint use fire training area (Westgate Fire Station) owned by the City of Dothan Fire Department.
H	-	Individuals picked up materials for household use.
LNDF	-	Material sent to local municipal dump or landfill.
NIU	-	Material was not in use at this time.
NLU	-	Material is no longer used.
PROC	-	Material used up in process (i.e. evaporation).
RAGS/TRASH	-	Wiped on rags and rags disposed of in general trash that went to a municipal dump or landfill.
STORM	-	Disposed of through the storm sewer system.
UNK	-	Disposal method is unknown.

- An abandoned underground septic tank is located on the west side of Building 100. This tank has not been used for hazardous waste disposal.

- An abandoned underground storage tank (UST) [state property] that once contained leaded automotive gasoline (MOGAS) is located just outside of the North Fence and immediately west of Building 100 at the Canteen. This tank has a capacity of 1000 gallons. It was installed in the 1950s and abandoned empty in the fall of 1986. There is no history of leaks from this tank.

- In the early to middle 1980s, a mixture of diesel fuel and waste oil was reportedly applied to most of the East Boundary Fence line and to the east half of the South Boundary Fence line. Ten to 15 gallons were applied once or twice per year for three or four years.

- An Oil and Hazardous Substance Pollution Contingency Plan has been in effect at the Station since March 10, 1983.

- The Station is not required to have a National Pollutant Discharge Elimination System (NPDES) Permit.

V. CONCLUSIONS

Information obtained through interviews with four present Station personnel, a review of Station records, and field observations indicated that there are no potentially contaminated disposal and/or spill sites on Station property.

VI. RECOMMENDATIONS

No further IRP investigation is recommended for the Station.

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GLOSSARY OF TERMS

ALLUVIAL - Pertaining to or composed of alluvium or deposited by a stream or running water.

ALLUVIUM - A general term for detrital deposits made by streams on river beds, flood plains, and alluvial fans. The term applies to stream deposits of recent time.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

ANTICLINE - A fold, generally convex upward, whose core contains the stratigraphically older rocks.

AQUICLUDES - A body of rock that will absorb water slowly but will not transmit it fast enough to supply a well or spring.

AQUIFER - A body of rock that is sufficiently permeable to conduct groundwater and yield economically significant quantities of water to wells and springs.

ARGILLACEOUS - Like or containing clay.

ARTESIAN AQUIFER - A water-bearing bed that contains water under hydrostatic pressure.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BED [stratig] - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks, it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDDING [stratig] - The arrangement of sedimentary rock in beds or layers of varying thickness and character.

BEDROCK - A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

BOULDER - A detached rock mass larger than a cobble, having a diameter greater than 256 mm, being somewhat rounded or otherwise distinctly shaped by abrasion in the course of transport.

CALCAREOUS - Containing calcium carbonate.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

CONE OF DEPRESSION - The depression of heads around a pumping well caused by the withdrawal of water.

CONFINED AQUIFER - An aquifer bounded above and below by impermeable beds, or by beds of distinctly lower permeability than that of the aquifer itself.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substances Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRETACEOUS - The final period of the Mesozoic era. Thought to have covered the time span between 135 and 65 million years ago; also, the corresponding system of rocks.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

CUESTA - An asymmetrical ridge, with a long, gentle slope on one side conforming with the dip of the underlying strata, and a steep or clifflike face on the other side formed by the outcrop of the resistant beds.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DIP - The angle that a stratum or any planar feature makes with the horizontal, measured perpendicular to strike and in the vertical plane.

DOLOMITE - A sedimentary rock consisting of calcium magnesium carbonate, $CaMg(Co_3)_2$. Occurs in beds formed by the alteration of limestone.

DRAINAGE CLASS (natural) - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well-drained - Water is removed from the soil readily, but not rapidly. It iavailable to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well-drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water moves in draining an area.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EROSION - The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agencies, but usually exclude mass wasting.

FERRUGINOUS - Pertaining to or containing iron.

FINE-GRAINED - Said of a soil in which silt and/or clay predominate.

FINE-TEXTURED (heavy textured) SOIL - Sandy clay, silty clay, and clay.

FLOOD PLAIN - The surface or strip of relatively smooth land adjacent to a river channel, constructed by the present river in its existing regimen and covered with water when the river overflows its banks.

FOLD [geol struc] - A curve or bend of a planar structure such as rock strata, bedding planes, foliation or cleavage.

FORMATION - A lithologically distinctive, mappable body of rock.

FOSSILIFEROUS - Containing fossils.

GLAUCONITIC SANDSTONE - greensand, composed of a green mineral, closely related to the micas and essentially a hydrous potassium iron silicate.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, December 11, 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazard Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HERBICIDE - A weed killer.

HILL - A natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well-defined outline (rounded) and generally considered to be less than 1000 feet from base to summit.

INTERBEDDED - Beds lying between or alternating with others of different character; especially rock material laid down in sequence between other beds.

LIMESTONE - A sedimentary rock consisting of the mineral calcite (calcium carbonate, $CaCO_3$) with or without magnesium carbonate.

LIMONITE - A common secondary material, formed by weathering (oxidation) of iron-bearing materials.

LITHOLOGY - (a) The description of rocks. (b) The physical character of a rock.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

MIGRATION [Contaminant] - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

NET PRECIPITATION - Precipitation minus evaporation.

OUTCROP - That part of a geologic formation or structure that appears at the surface of the Earth.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment by the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PLEISTOCENE - The first epoch of the Quaternary period; the Pleistocene began two to three million years ago and lasted until the start of the Holocene period some 8000 years ago.

POND - A natural body of standing fresh water occupying a small surface depression, usually smaller than a lake and larger then a pool.

POROSITY - The ratio of the aggregate volume of interstices in a rock or soil to its total volume.

POTENTIOMETRIC SURFACE - An imaginary surface representing the total head of groundwater and defined by the level to which water will rise in a well. The water table is a particular potentiometric surface.

QUARTZ - A crystalline silica, an important rock forming mineral: SiO_2. Occurs either in transparent hexagonal crystals (colorless or colored by impurities) or in crystalline. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUATERNARY - The second period of the Cenozoic era, following Tertiary; also, the corresponding system of rocks.

RECENT - An epoch of the Quaternary period which covers the span of time from the end of the Pleistocene epoch, approximately 8000 years ago, to the present. Also called the Holocene epoch.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2 mm.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular sand fragments set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SANDY LOAM - A soil containing 43 - 85% sand, 0 - 50% silt, and 0 - 20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30% or containing 43 - 52% sand, less than 50% silt, and less than 7% clay.

SEDIMENTARY ROCK - A rock resulting from the consolidation of loose sediment that has accumulated in layers; e.g., a clastic rock (such as conglomerate or tillite) consisting of mechanically formed fragments of older rock transported from its source and deposited in water or from air or ice; or a chemical rock (such as rock salt or gypsum) formed by precipitation from solution; or an organic rock (such as certain limestones) consisting of the remains or secretions of plants and animals.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (especially by compression) of clay, silt, or mud.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20% sand.

SILT LOAM - A soil containing 50 - 88% silt, 0 - 27% clay and 0 - 50% sand.

SILTSTONE - An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as the distance per unit time that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	-	less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	-	0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	-	0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	-	0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)

Moderately Rapid - 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)

Rapid - 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)

Very Rapid - more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

STONE - A general term for rock that is used for construction, either crushed for use as aggregate or cut into shaped blocks as dimension stone.

STRATIFIED - Formed, arranged, or laid down in layers or strata; especially said of any layered sedimentary rock or deposit.

STRATIGRAPHIC UNIT - A body of strata recognized as a unit for description, mapping, or correlation.

STRIKE - The direction taken by a structural surface, e.g., a bedding or fault plane, as it intersects the horizontal.

STRUCTURAL - Of or pertaining to rock deformation or to features that result from it.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

TERRACE [geomorph] - Any long, narrow, relatively level or gently inclined surface, generally less broad than a plain, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope.

TERTIARY - The first period of the Cenozoic era, thought to have covered the span of time between 65 million and 2 million years ago; also, the corresponding system of rocks.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and man-made features.

UNCONSOLIDATED - (a) Sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. (b) Soil material that is in a loosely aggregated form.

VALLEY - Any low-lying land bordered by higher ground, especially an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water; the surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

Appendix A

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1) Alabama Air National Guard
187th Tactical Fighter Group
Civil Engineering
P.O. Box 250284
Montgomery, Alabama 36125-0284
Captain Michelle Fuller
(205) 284-7302

2) Alabama Department of Environmental Management
1751 Dickinson Drive
Montgomery, Alabama 36130
James McIndse
(205) 271-7826

3) Alabama Natural Heritage Program
Alabama Department of Conservation and Natural Resources
State Lands Division
64 North Union Street
Montgomery, Alabama 36130
Mark A. Bailey
(205) 261-3007

4) City of Dothan
Planning Commission
P. O. Box 2128
Dothan, Alabama 36302
David Hendrix
(205) 793-0178

5) City of Dothan
Water and Electric Department
P. O. Box 2178
Dothan, Alabama 36302
Rodney Barramore
(205) 793-0120

6) Defense Reutilization and Marketing Office
Building 1313
Fort Rucker, Alabama 36362-5286
Dianne Lawhon
(205) 255-5263

OUTSIDE AGENCY CONTACT LIST (continued)

7) Federal Emergency Management Agency
Natural and Technological Hazards Division
1371 Peachtree Street NE
Suite 735
Atlanta, Georgia 30309
Don Hansford
(404) 553-4424

8) International Service Systems, Inc.
P. O. Box 1569
Dothan, Alabama 36302
Becky Emery
(205) 792-4181

9) Layne - Central Company
3720 North Palafox Street
Pensacola, Florida 32505
Greg Hardin
(904) 432-5101

10) Publication Sales Office
Geological Survey of Alabama
P.O. Box O
Tuscaloosa, Alabama 35486-9780
(205) 349-2852 (Ext. 303)

11) U. S. Army Aviation Center (USAANC)
Directorate of Engineering and Housing
Operations and Maintenance Division
Building 1401
Fort Rucker, Alabama 36362
Ronald Leatherwood
(205) 255-2988

12) United States Department of Agriculture
Soil Conservation Service
1693 Ross Clark Circle
Dothan, Alabama 36301
(205) 792-9898

OUTSIDE AGENCY CONTACT LIST (continued)

13) United States Fish and Wildlife Service
P. O. Drawer 1190
Daphne, Alabama 36526
Sandy Tucker
(205) 690-2181

14) United States Geological Survey
Water Resources Division
2721 Gunter Park Drive West
Montgomery, Alabama 36109
Riley Cobb
(205) 223-7511